# Allotment Management Plan
# Twin Tanks Allotment
# December 2008

## 1. Introduction

This Allotment Management Plan (AMP) was developed following a Decision Memo for the Twin Tanks Allotment signed by Martie Schramm, Williams District Ranger, in September 2008.

The Twin Tanks Allotment is located approximately seven miles northeast of Williams, Arizona. The allotment runs from Cedar Mountain on the west side to Sitgreaves Mountain on the southeast corner. It contains approximately 11,940 Forest Service acres. Grasslands, pinyon/juniper and ponderosa pine dominate the vegetation on the allotment at an elevation ranging from 6,400 to 9,300 feet.

## 2. Desired Conditions (Goals and Objectives)

The overall desired condition is maintenance of sustainable ecosystems within and surrounding the Twin Tanks Allotment, in which livestock grazing does not impair important ecosystem functions, such as maintaining soil stability and productivity, and maintaining vegetation diversity and productivity.

Specific desired conditions that apply to the allotment include the following:

***Vegetation***

- Total herbaceous plant cover trends mirrors or improves upon trends in livestock excluded areas.
- Provide for a diversity of cool and warm season plants. Cool season plants trends mirrors or improves upon trends in livestock excluded areas.
- Protect Threatened, Endangered, and Sensitive plant species from adverse effects caused by livestock grazing and grazing management activities.
- Eradicate or control as many existing populations of noxious weeds as possible and prevent new introductions of noxious weeds caused by livestock management activities.

***Soils***

- Minimize erosion caused by livestock grazing and grazing management activities by maintaining soil condition and bare ground that mirrors or improves upon trends in livestock excluded areas.
- Total litter cover trends mirrors or improves upon trends in livestock excluded areas.

## 3. Background

Livestock grazing has occurred within the area since the late 1880's. Permitting began around 1905 with the establishment of the National Forests. No specific documentation is available regarding the type and number of livestock grazed Forest-wide in the early years, but general historic observations indicate that livestock numbers were high. The allotment has had the same permitted number of livestock and season of use since 1967. The current grazing permittee has held the permit on this allotment since 1987.

Current permitted use for the Twin Tanks allotment allows up to 1025 head of sheep from May 21 – October 20 (153 days) and 30 head of rams from June 11- July 11 (31 days), which are 1037 Animal Unit Months (AUM's) and 5187 Head Months (HM's). Allotment management follows a deferred rotation grazing system, which is managed by a herder with typically one band of sheep. There are no interior pasture fences; the sheep are herded through five grazing areas: Boulin, Little Squaw Mountain, Twin Tanks, Locust Tank, and Cedar Mountain.

The allotment is primarily juniper grassland on the west half on the allotment and transitions to ponderosa pine on the east half of the allotment. The topography is flat to steep with Cedar Mountain, Wildcat Hill, Little Squaw Mountain, and Sitgreaves Mountains scattered within the allotment area. Small intermittent drainages occur throughout the allotment but no riparian vegetation or hydric soils are present. These drainages run during snow melt and heavy monsoon storms.

Differences exist between the potential natural community and the existing vegetation as the result of tree encroachment, historic livestock grazing, drought, and climate change. Ponderosa pine, pinyon, and juniper trees have encroached into the grasslands, competing for available nutrients, moisture, and sunlight. This trend has been attributed to a combination of climatic shifts, control of fire, and grazing. Cool season grass species have been replaced with the warm season blue grama. This trend is seen throughout the Williams Ranger District, and is attributed to the shift in climate.

Actual use has varied primarily due to drought, adaptive management, or ranch objectives. For example, in the 18 year period from 1991 thru 2008, full numbers of sheep were run nine times (see Table 1). Permitted sheep numbers, under the current grazing management system, fall within the carrying capacity of the allotment (65% of current estimates). Carrying capacity for this analysis is based on: actual use data, condition and trend monitoring, sheep and wildlife use patterns, sheep health and condition, soil surveys (Terrestrial Ecosystem Survey), forage production estimates, and professional opinion.

The trend for Twin Tanks Allotment is generally stable for range condition and upward for soil condition. A reduction in cool season grass species is following trend found throughout the Forest in grazed and ungrazed areas. The cool season grass reduction is most likely caused by a decrease in winter moisture and an increase in warm season grasses.

One monitoring transect was established on the Twin Tanks Allotment in 1960 and a pace frequency transect read there in 2008. Eleven paced transects were done in the fall of 2007. The results of this monitoring indicate either a static or upward trend.

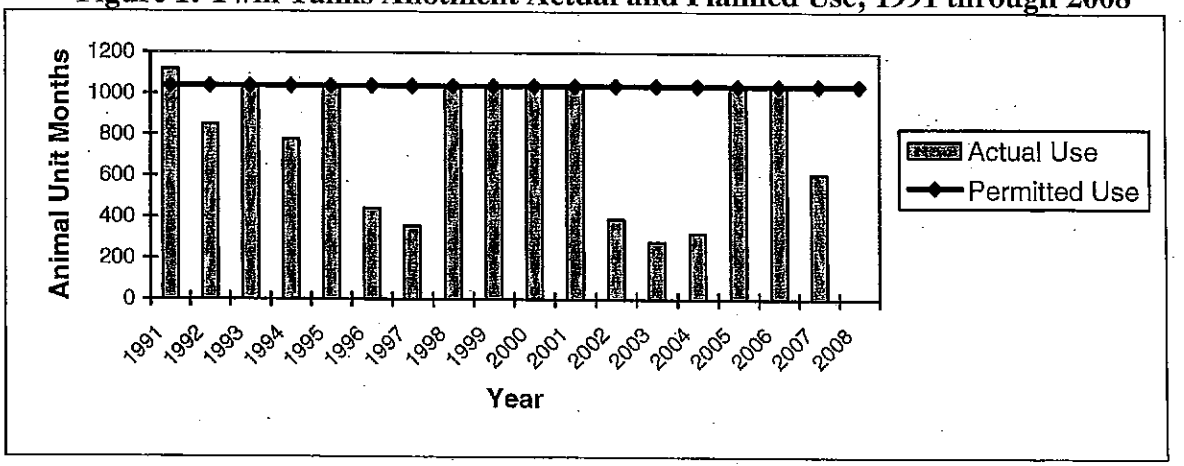
These range condition trends exist under the current sheep grazing system and within the current utilization guideline for sheep and wildlife. Grazing has remained within this utilization guideline and sheep have been able to use the area for the full length of the grazing season.

**Table 1. Twin Tanks Allotment Actual Use, 1991-2008**

| Year | Number (Sheep) | HM's | AUM's (0.2 AU Factor) |
|---|---|---|---|
| 2008 | 0 | 0 | 0 |
| 2007 | 1025 + 30 Rams (6/11-7/11) | 3064 | 609 |
| 2006 | 1025 + 30 Rams (6/11-7/11) | 5187 | 1037 |
| 2005 | 1025 + 30 Rams (6/11-7/11) | 5187 | 1037 |
| 2004 | 1025 + 24 Rams (6/11-7/6) | 1604 | 321 |
| 2003 | 1025 + 15 Rams (6/11-6/30) | 1392 | 278 |
| 2002 | 1025 + 30 Rams (6/11-7/11) | 1952 | 390 |
| 2001 | 1025 + 30 Rams (6/11-7/11) | 5187 | 1037 |
| 2000 | 1025 + 30 Rams (6/11-7/11) | 5187 | 1037 |
| 1999 | 1025 + 30 Rams (6/11-7/11) | 5187 | 1037 |
| 1998 | 1025 + 30 Rams (6/11-7/11) | 5187 | 1037 |
| 1997 | 1025 + 30 Rams (6/11-7/11) | 1784 | 357 |
| 1996 | 600 (8/2-9/2),1000 (9/3-10/20) | 2209 | 442 |
| 1995 | 1025 + 30 Rams (6/11-7/11) | 5187 | 1037 |
| 1994 | 1030 + 25 Rams (6/2-7/2) | 3884 | 777 |
| 1993 | 1025 + 30 Rams (6/11-7/11) | 5187 | 1037 |
| 1992 | 1030 + 25 Rams (5/25-7/25) | 4250 | 850 |
| 1991 | 1025 + 30 Rams (6/11-7/11) | 5592 | 1118 |

Between 1991 and 2008, actual use ranged from zero to 1055 sheep, with the allotment fully stocked (actual AUMs equal to permitted AUMs) in 9 of those 18 years (Figure 1). Reductions in stocking levels were primarily in response to drought conditions.

**Figure 1: Twin Tanks Allotment Actual and Planned Use; 1991 through 2008**



## 4. Current Conditions

Monitoring data were evaluated by a Kaibab National Forest interdisciplinary team to assess changes in range conditions on the Twin Tanks allotment. Data were available from a Parker Three Step transect (Parker transect), paced transects, and Terrestrial Ecosystem Survey (Forest Service 1991). Parker transect long-term monitoring data was collected in 1960 and a Pace Frequency transect at the same site in 2008. Paced transect data were collected at eleven sites in 2007 to supplement the Parker transect data. Terrestrial Ecosystem Survey data were collected between 1979 and 1986.

**Vegetation:** The Twin Tanks Allotment is characterized by rolling grassland plain transitioning to a pinyon/juniper forest and a ponderosa pine forest. The vegetation condition score was 23 (poor) in 1960 and ranged from 27 (poor) to 45 (fair) in 2007/2008 (see Table 2). Monitoring data indicates that cool season grasses such as bottlebrush squirreltail declined since the 1960's, while blue grama, a warm season grass, has remained stable or increased.

**Soils and Watershed:** The allotment is dominated by grassland and savannah soil types (Mollisol soil order or mollic subgroups). The soil condition score was 25 (Poor) in 1960 and ranged from 34 (poor) to 98 (excellent) in 2007/2008 (see Table 3).

**Table 2. Vegetation condition scores determined on Parker transect and paced transects within the Twin Tanks Allotment.**

| Soil Map Unit | Transect | 1960 | 2007 | 2008 |
|---|---|---|---|---|
| 507 | C5 | 23 | | NA |
| 507 | P1 | | 39 | |
| 537 | P2 | | 27 | |
| 495 | P2-8 | | 44 | |
| 507 | P2-9 | | 35 | |
| 405 | P3 | | 34 | |
| 507 | P3-10 | | 41 | |
| 563 | P4 | | 43 | |
| 507 | P4-11 | | 45 | |
| 326 | P5 | | 35 | |
| 495 | P6 | | 35 | |
| 324 | P7 | | 38 | |

Condition scores correspond to the following ratings:
Very Poor = 0-20; Poor = 21-40; Fair = 41-60; Good = 61-80; Excellent = 81-100.

**Table 3. Soil condition scores determined on Parker transect and paced transects within the Twin Tanks Allotment.**

| Soil Map Unit | Transect | 1960 | 2007 | 2008 |
|---|---|---|---|---|
| 507 | C5 | 25 | | NA |
| 507 | P1 | | 43 | |
| 537 | P2 | | 98 | |
| 495 | P2-8 | | 47 | |
| 507 | P2-9 | | 49 | |
| 405 | P3 | | 76 | |
| 507 | P3-10 | | 48 | |
| 563 | P4 | | 81 | |
| 507 | P4-11 | | 52 | |
| 326 | P5 | | 64 | |
| 495 | P6 | | 34 | |
| 324 | P7 | | 86 | |

Condition scores correspond to the following ratings:
Very Poor = 0-20; Poor = 21-40; Fair = 41-60; Good = 61-80; Excellent = 81-100

Changes in the density and diversity of cool-season perennial grasses are important factors in evaluating range condition and trend. On the allotment, impacts from drought periods occurring after 1985 and changing precipitation patterns (drier winters and springs, late monsoons) are believed to be a significant factor in the loss of cool season grasses and, as a result, a decline in range condition scores. This is supported by Parker Three-Step Cluster data from an exclosure on the Pine Creek Allotment as well as a relic area on the Hat Allotment that has never been exposed to livestock grazing. Data collected from both sites shows similar declines in cool-season grasses and a decline in range condition and trend.

The results of the 2007/2008 monitoring indicate an overall static trend in range condition and an upward trend in soil condition as supported by exclosure data. The exclosures mentioned above do not show a difference inside and outside the exclosures. From 1996 to 2007, during a drought period, cool season grasses have declined while warm season grasses and ground cover have increased.

These range condition trends exist under the current sheep grazing system and within the current utilization guideline for sheep and wildlife. Grazing has remained within this utilization guideline and sheep have been able to use the area for the full length of the grazing season. Sheep must be moved early if the grazing intensity level is reached prior to planned rotations, or may not enter an area if grazing intensity from wildlife already meets the grazing intensity guideline.

## 5. Management Strategy

Livestock grazing is authorized on the Twin Tanks Allotment under the terms and management prescriptions described below.

The authorization is through a term grazing permit for 1,025 head of sheep from 5/21-10/20, and 30 rams from 6/11-7/11. Permitted use is based on condition and trend studies completed in 2007, actual use data for the allotment for the past 18 years and the effects of this use on resource conditions. It also reflects the estimated annual forage production available for sheep on the allotment considering climate, grazing period, grazing occurrence, timing, frequency, and intensity of grazing proposed as well as proper livestock management.

The current utilization[1] guideline would continue to allow up to 40 percent use by sheep and/or wildlife at the end of the grazing season. This includes "conservative" grazing intensity which is measured before the end of the growing season and is used in determining when sheep need to move to the next pasture, in consideration of other factors such as weather patterns, likelihood of plant regrowth, and previous years' utilization levels. Sheep would move to the next grazing area when grazing intensity approaches a conservative level (40%) before August 30. This area would not be grazed again during the grazing season.

**Adaptive Management**

The AMP includes the continued use of adaptive management, which provides more flexibility for managing sheep. Adaptive management allows the Forest Service to adjust the timing, period and occurrence of sheep grazing, movement of sheep within the allotment, and sheep numbers. If adjustments are needed, they are implemented through the Annual Operating Instructions, which would adjust numbers so use is consistent with current productivity. This allows plant, soil, and watershed conditions to be maintained or improved while range improvements are implemented over time. An example of a situation that could call for adaptive management adjustments is drought.

Adaptive management is designed to provide sufficient flexibility to adapt management to changing circumstances. If monitoring indicates that desired conditions are not being achieved, management will be modified in cooperation with the permittee. Changes may include administrative decisions such as the specific number of livestock authorized annually, specific dates of grazing, or modifications in grazing rotations, but such change will not exceed the limits for timing, intensity, period, number, occurrence and frequency of sheep grazing defined in this AMP.

[1] Utilization is the proportion or degree of current year's forage production that is consumed or destroyed by animals (including insects). It is a comparison of the amount of herbage left compared with the amount of herbage produced during the year. Utilization is measured at the end of the growing season when the total annual production can be accounted for, and the effects of grazing in the whole management unit can be assessed. Utilization guidelines are intended to indicate a level of use or desired stocking rate to be achieved over a period of years.

## 6. Resource Protection Measures

1) Manage grazing intensity to not exceed Conservative Use category during the growing season, and to not exceed Conservative Use category at or near the end of the growing season when the potential for plant regrowth is limited. These grazing intensity categories can be exceeded in limited areas where livestock concentrate: a) within 1/4 mile of water developments (including temporary water hauls) and salt and supplement stations; and b) within 1/10 mile of pasture gates.

2) Consider a variety of factors related to drought when making decisions on annual authorization of livestock numbers and grazing period, including: a) amount and timing of current-year and previous-year precipitation received at weather stations nearest to each allotment, b) current-year and previous-year forage production as they contribute to current standing forage, c) estimates of current-year and previous-year grazing intensity, d) current and projected amount and distribution of water available to livestock (Howery 1999, Forest Service 2006).

3) Permittees must distribute livestock throughout the suitable grazing areas using appropriate methods, including placement of salt and supplements, water hauling, and herding.

4) Follow applicable Best Management Practices for range management from the *Soil and Water Conservation Practices Handbook* (Forest Service Handbook [FSH] 2509.22) to minimize soil and watershed impacts caused by livestock grazing and grazing management activities.

5) Follow applicable direction in the *Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds* (Forest Service 2005a: pages 281-282) to minimize the risk of new weed infestations caused by livestock grazing and grazing management activities. Relevant direction includes: a) Consider weed prevention and control practices in the management of grazing allotments; b) Minimize transport of weed seed into and within allotments; c) Maintain healthy, desirable vegetation that is resistant to weed establishment; d) Minimize ground disturbance; e) Promote weed awareness and prevention efforts among range permittees.

## 7. Monitoring

Two general categories of monitoring would be conducted: implementation monitoring and effectiveness monitoring. Implementation monitoring determines whether resource protection measures and management practices detailed in the Forest Plan, allotment management plan, and annual operating instructions are implemented. Relevant components of the proposed action detailed in the NEPA document will be incorporated into the term grazing permit, allotment management plan, and annual operating instructions. Implementation monitoring includes determination of range readiness, evaluation of grazing intensity, estimation of forage production, evaluation of rangeland use, and grazing capacity determination (Forest Service 1997: pages 4-3 to 4-8).

The Forest Service and/or the Permittee will monitor grazing intensity in each year grazed at least once a year. Various methods will be used to evaluate grazing intensity, including one or more of the following: determination of forage utilization, amount of forage standing crop remaining at the end of the grazing cycle, percentages of grazed and ungrazed plants, plant stubble heights, litter or carryover vegetation from previous years, and visual appearance (Holechek and Galt 2000, Holechek and Galt 2004, Holechek et al. 2004: pages 195-196 and 248-251).

In addition to implementation monitoring conducted by the Forest Service, the permittee will be encouraged to help monitor grazing intensity and avoid exceeding grazing intensity levels specified above in Resource Protection Measures #1. Coordination between the permittee and the Forest Service will be encouraged to help the permittee accurately determine grazing intensity. In addition, the permittee will be encouraged to provide the Forest Service with actual use records at the end of each grazing season, including 1) livestock number; 2) grazing period; and 3) estimate of average grazing intensity at key areas on departure from grazing areas.

Effectiveness monitoring determines whether management practices are effective in moving the allotment toward desired conditions. Effectiveness monitoring is designed to determine the trend toward or away from desired conditions for vegetation resources, soil and watershed resources, and wildlife resources.

Long-term trend monitoring will be conducted at the historic Parker transect on the allotment every 5 to 10 years or as funding is available. Paced transects sites will also be read to delineate vegetation condition classes and provide additional data on composition, vigor, cover, and soil conditions over the larger area. During the next reading of these monitoring sites plant frequency and ground cover plots may be used to estimate trend, dry weight rank method will estimate relative species composition by weight, and species composition will be estimated by 1/10 acre canopy cover plots.

Data collected from both implementation monitoring and effectiveness monitoring will be continually evaluated by rangeland range staff and other Forest Service resource managers (e.g., wildlife biologist) to assess whether changes in allotment management are needed to achieve desired conditions and objectives.

Monitoring is adaptive, and as improved methods are developed these new methods will be considered. Historic monitoring could be adapted to include these improved methods. Depending on the availability of funding, the type of monitoring and frequency for the monitoring would include: visual observations conducted on a yearly basis to include permittee compliance, allotment inspections, range readiness, forage productivity, and rangeland utilization.

## 8. Grazing Capability and Grazing Capacity

An analysis of grazing capability and grazing capacity was conducted on the Twin Tanks Allotment in 2008. See Tables 4 and 5 for Capacity Classification by TES Map Units and Acres, respectively, on this allotment. Grazing capability of a land area is dependent upon the interrelationship of the soils, topography, plants and animals. Grazing capability is expressed as one of three capacity classes:

*Full Capacity (FC)* – areas that can be used by grazing animals under proper management without long-term damage to the soil or vegetative resource. They must also produce a minimum of 100 pounds per acre of forage and are on slopes less than 40 percent.

*Potential Capacity (PC)* – areas that could be used by grazing animals under proper management but where soil stability is impaired, or range improvements are not adequate under existing conditions to obtain necessary grazing animal distribution. Grazing capacity may be assigned to these areas, but conservative allowable use assignments must be made.

*No Capacity (NC)* – areas that cannot be used by animals without long-term damage to the soil resource or plant community, or are barren or unproductive naturally. In addition, it includes areas that produce less than 100 pounds per acre of forage and/or are on slopes greater than 40 percent. Grazing capacity is not assigned to sites with a "no capacity" classification.

**Table 4. Grazing Capacity Classification by TES Map Unit**

| TES Map Unit | Capacity | Acres |
|---|---|---|
| 006 | Full | 47 |
| 300 | None | 567 |
| 302 | None | 491 |
| 310 | None | 9 |
| 312 | None | 16 |
| 322 | None | 341 |
| 324 | Full | 364 |
| 325 | Full | 1,059 |
| 326 | Full | 563 |
| 401 | Full | 341 |
| 402 | None | 173 |
| 405 | Full | 901 |
| 406 | None | 533 |
| 431 | None | 153 |
| 476 | None | 142 |
| 495 | Full | 692 |
| 496 | None | 424 |
| 507 | Full | 1,925 |
| 514 | Full | 105 |
| 537 | Full | 279 |
| 563 | Full | 2,784 |
| 564 | Full | 28 |

Grazing capacity is a function of grazing capability, forage production, proper use by livestock, and the level of management that may be applied. This analysis used forage production and grazing capability to determine the estimated grazing capacity of the allotment. Forage production estimates were taken on the allotment. Production data from the Terrestrial Ecosystem Survey (TES) was used for any data gaps. An allowable use standard of 40 percent was used on the Full Capacity acres within the allotment and zero for No Capacity rangeland.

This analysis revealed that under current management, permitted livestock are utilizing:

- 65% of the estimated grazing capacity on the Twin Tanks Allotment,

In terms of total estimated forage production, permitted livestock are utilizing:

- 22% of the estimated forage produced on the Twin Tanks Allotment,

This analysis indicates that the current permitted livestock numbers are within the estimated grazing capacity of these allotments (see Table 5).

**Table 5. Grazing Capacity for the Twin Tanks Allotment.**

| Grazing Capacity Estimates By Allotment | Twin Tanks |
|---|---|
| **A) Forage Required by Permitted Livestock** | 829,600 pounds (1,037 AUM's) |
| **B) Grazing Capacity** (FC acres only with established utilization standards) | 1,274,784 pounds (1,700 AUM's) |
| **C) Total Estimated Allotment Forage Production** (FC and NC acres) | 3,739,527 pounds (4,674 AUM's) |
| **D) Forage required by permitted livestock as a percentage of the Grazing Capacity** (A÷B) | 65% |
| **E) Forage required by permitted livestock as a percentage of the Total Allotment Forage Production** (A÷C) | 22% |

An AUM (Animal Unit Month) is amount of forage required by an animal unit for one month; approximately 800 pounds/AUM.

## 9. Range Improvements

1) Existing Structures
Range improvements (fencing, waters, handling facilities, etc.) are critical components of any grazing management plan. All range improvements assigned to the permittee (Table 6) need to be maintained in order to facilitate proper management of the allotment.

**Permittees are required to follow the District's Heavy Equipment Policy prior to beginning any ground disturbing activities which may require an archaeological survey and/or wildlife clearances.**

2) New Construction
No new range improvements have been identified in the NEPA process for the Twin Tanks Allotment.

**Table 6. Improvement Maintenance Responsibility for the Twin Tanks Allotment**

| Improvement Name | Improvement Number | Improvement Type | Units in Place |
|---|---|---|---|
| Twin/Homestead Boundary | 1977 | Fence, Allotment Boundary | 1.25 miles |
| Boulin Trick Tank | 1983 | Collection Apron | 1.0 |
| Boulin Trick Tank Storage | 1984 | Water Storage Tanks | 4.0 |
| Locust Tank | 1985 | Earthen Tank | 1.0 |
| Twin Tank South | 1987 | Earthen Tank | 1.0 |
| Boulin Corral | 1988 | Handling Facility | 1.0 |
| Twin Tank Forest Boundary | 2200 | Fence, Forest Boundary | 1.2 miles |
| Twin/Sitgreaves Boundary | 2258 | Fence, Allotment Boundary | 1.0 miles |

## 10. Flexibility/Adaptive Management

It is imperative that flexibility and adaptive management be considered when following this allotment management plan. Adjustments to the grazing sequence may be necessary due to weather constraints (i.e. precipitation patterns favor or do not favor certain portions of the allotment), or management activities in an allotment or pasture (P/J treatment or prescribed burning).

There may also be a need to vary livestock numbers to meet objectives. Drought may force the reduction of livestock numbers while on the other hand additional numbers above term permit may be appropriate in certain situations.

## 11. Travel Management

The Kaibab National Forest has actively pursued a road closure program for the last several years. This program is aimed at reducing non-essential roads for watershed protection and to decrease disturbance to wildlife. These closures must also be honored by the Permittees.

If you need to enter a motor vehicle restricted area, you must have special authorization in the form of an Off-Road Vehicle Permit or specific authorization through your Annual Operating Instructions. Entering a restricted area without authorization is a violation of 36 CFR 261.

Additionally, the Williams Ranger District is currently planning the implementation of the Travel Management Rule, as directed by the Washington and Regional Offices of the Forest Service. The end product of the Travel Management Process will be a map of roads open to public travel. All other roads will be closed to the public and cross country vehicle travel will be prohibited across both districts. Many roads that will not be open to the public may remain open to Forest Service employees and grazing Permittees for administrative purposes. Access for Permittees will be refined during the Travel Management Process and in Annual Operating Instructions. The Travel Management Process is still open for public comment. For more information or to comment, call your district grazing permit administrator or check the Kaibab National Forest website at http://www.fs.fed.us/r3/kai/travelmanagement/index.shtml.